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Internal gravity wave impact on the dynamic regime of the lower thermosphere

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Abstract

On the basis of radar meteor observations of the wind velocity in Kazan at 80-110 km during 1993-1995, 1395 harmonics of internal gravity waves (IGWs) with periods from 1 to 24 h are found. A comparison of the vertical profiles of the specific wave energy density in summer and winter shows that wave atten-uation occurs from about 90 km and the average wave energy density per IGW harmonic at all altitudes is 1.5-2 times higher in winter than in summer. The wave fluxes are found to decelerate zonal winds and to accelerate meridional winds. The meaningful variations with periods of 24, 12, 6, and 4 months revealed in both the mean circulation and IGW corrections to the wind velocity manifest a close relationship and mutual influence between upper atmospheric motions such as the mean circulation and IGWs. A comparison between our results and those derived from the 1986-1987 data demonstrates the similarity of IGW fields in the lower thermosphere in the ascending and descending branches of the 11-year cycle of solar activity.